

FIG. 1A

STEP 1: GATE OXIDATION
0.8-2.0 nm

104

FIG. 1B

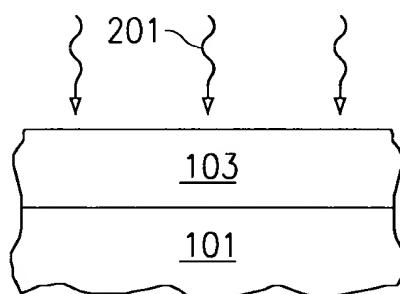


FIG. 2A

STEP 2: PLASMA NITRIDATION
100-500W, 20-80 mTorr,
He/N₂=75/25%, 10-60s

204

FIG. 2B

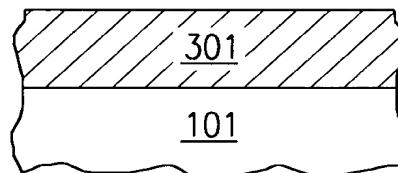


FIG. 3A

STEP 3: RE-OXIDATION AND ANNEALING

H₂/N₂+O₂/N₂
SEQUENCE

TEMPERATURE
"SPIKE"

RAPID
NH₃

H₂/N₂O
MIXTURE

310

311

312

313

304

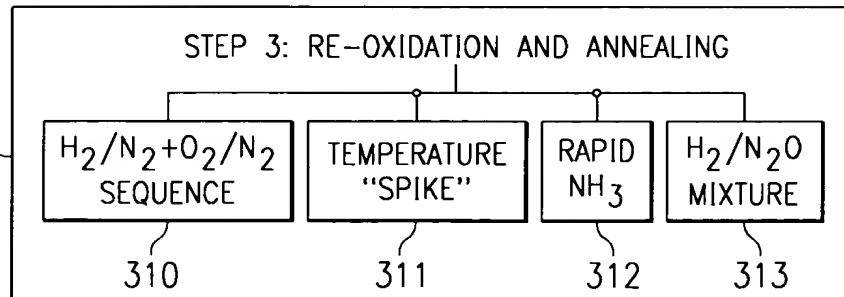


FIG. 3B

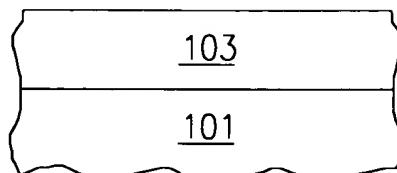


FIG. 4A

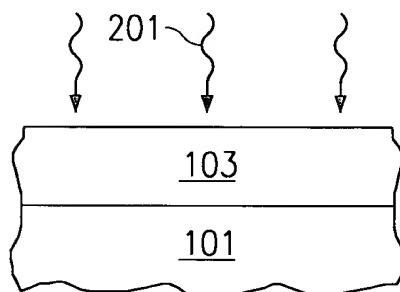


FIG. 4B

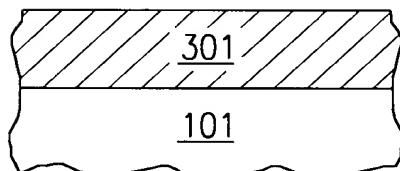


FIG. 4C

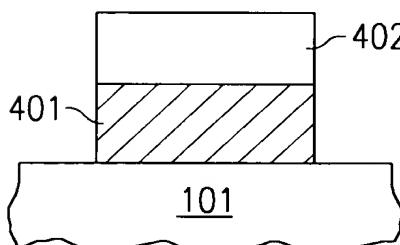


FIG. 4D



FIG. 5A

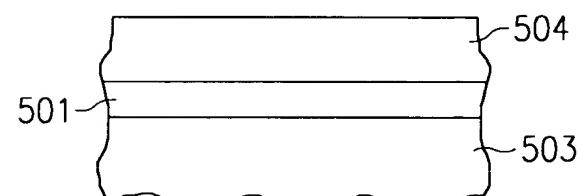


FIG. 5B

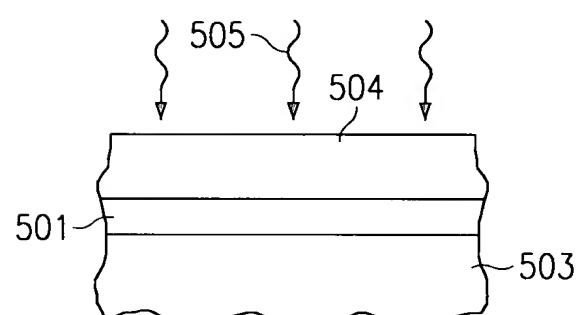


FIG. 5C

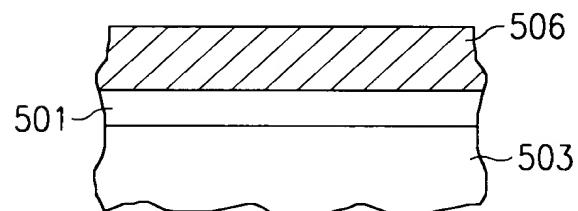


FIG. 5D

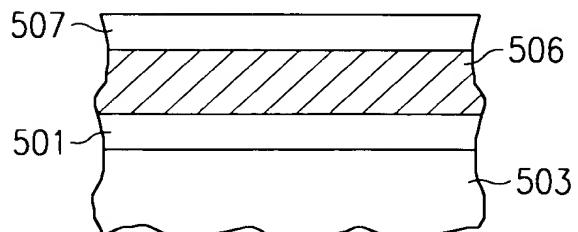


FIG. 5E

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FIG. 6

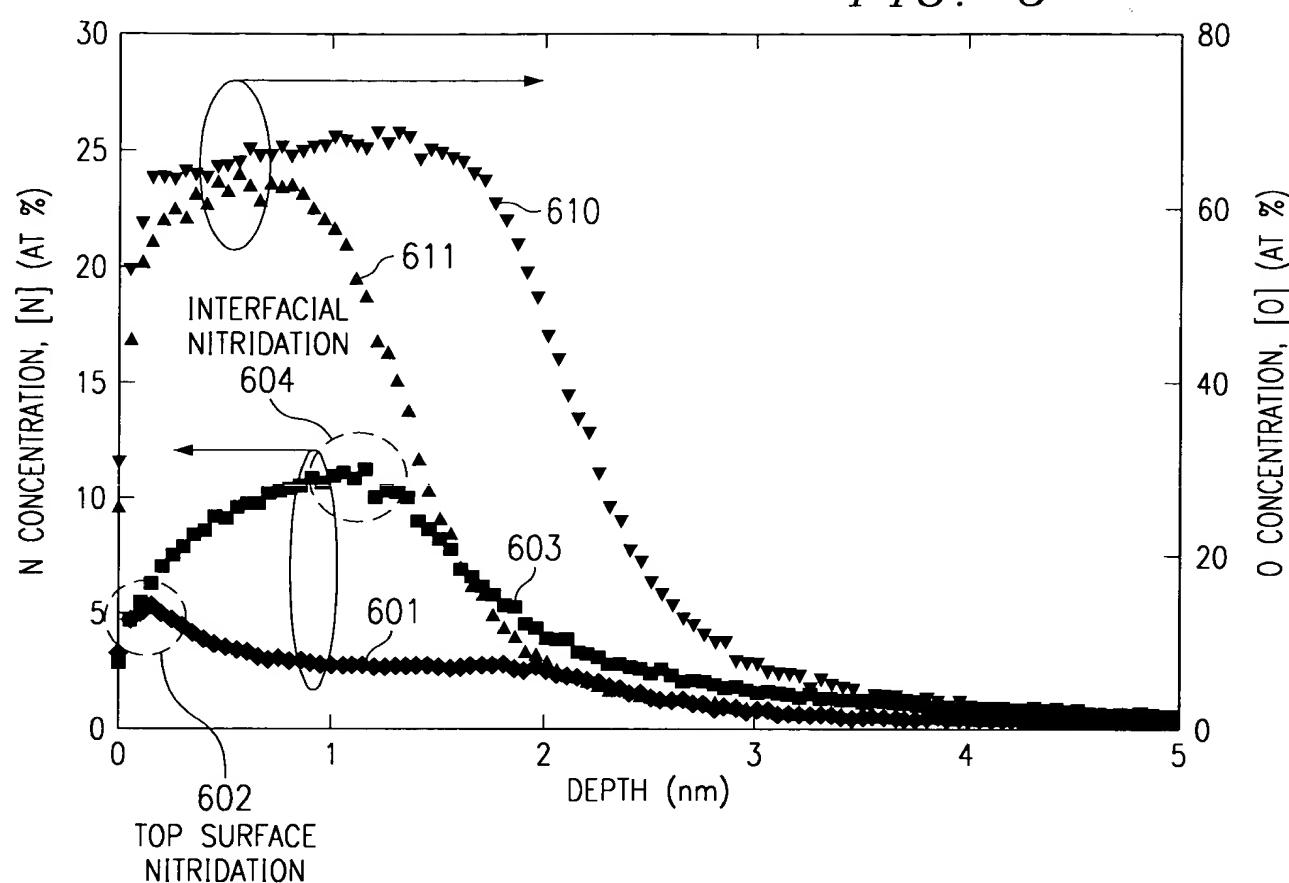
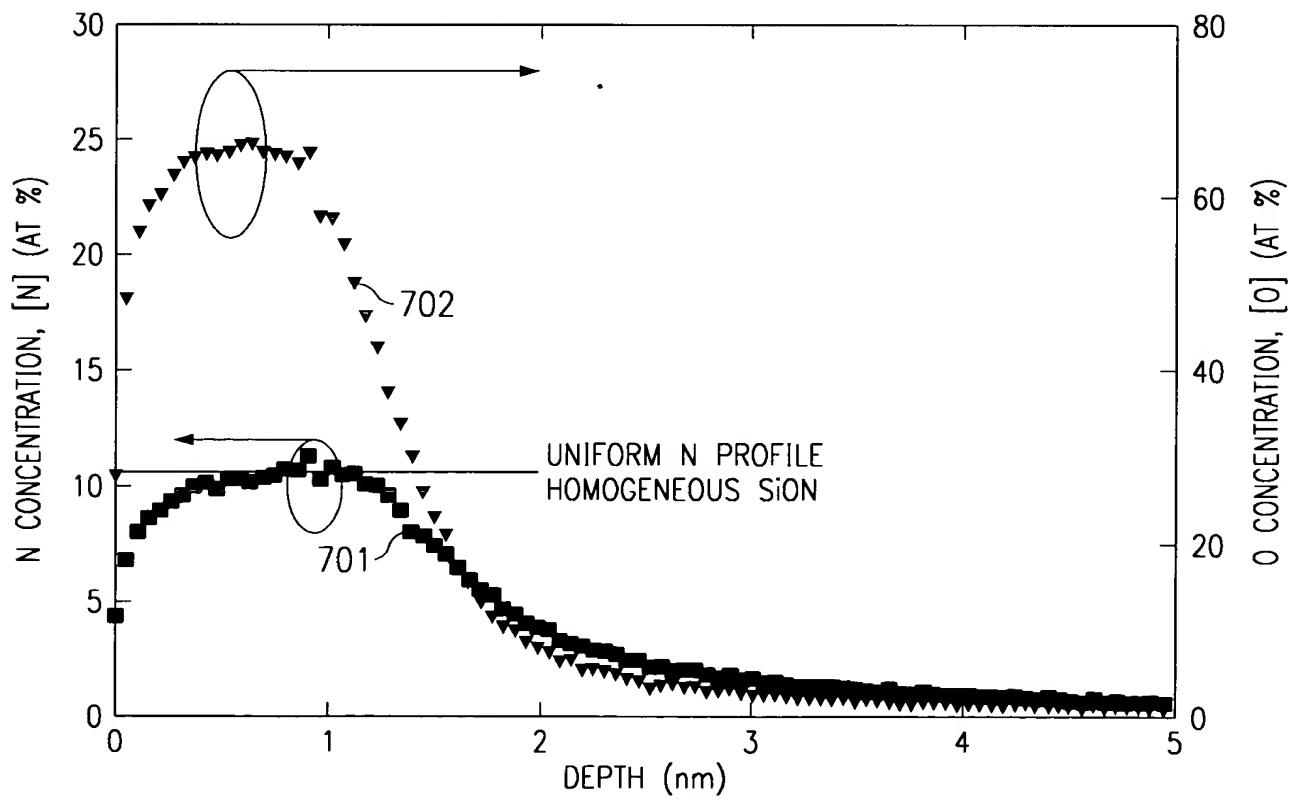


FIG. 7



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TEMPERATURE: $TEMP_1 = 600 - 1000^\circ\text{C}$
 $TEMP_2 = 800 - 1000^\circ\text{C}$
 TIME: $t_1 = 5 - 60\text{s}$
 $t_2 = 5 - 60\text{s}$

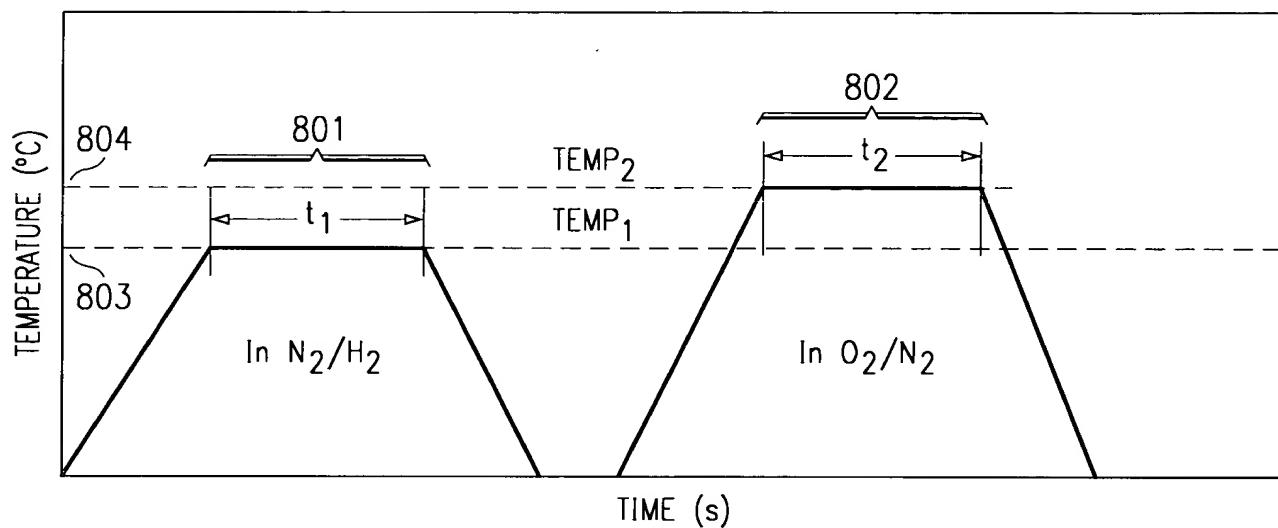


FIG. 8

TEMPERATURE: $TEMP_2 > TEMP_1$, $T_2 > T_1$
 TIME: $t_2 \ll t_1$

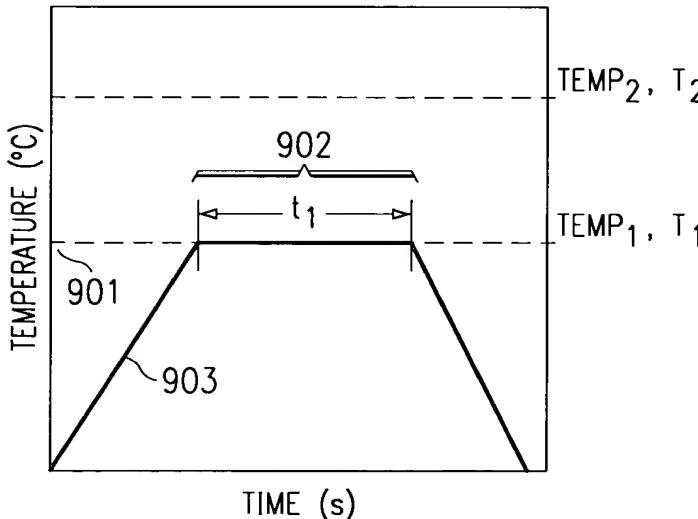


FIG. 9A

TEMPERATURE: $TEMP_2 > TEMP_1$, $T_2 > T_1$
 TIME: $t_2 \ll t_1$

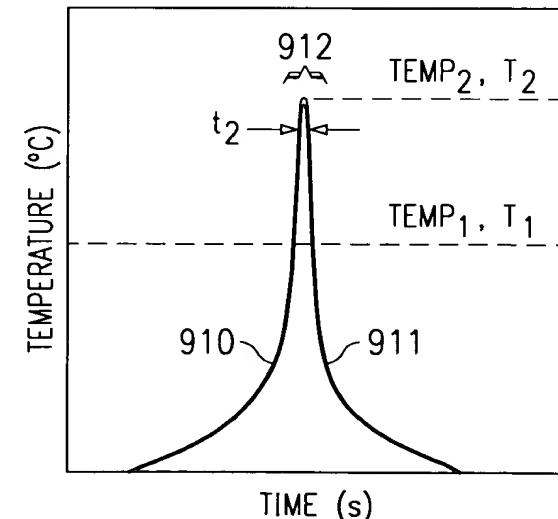


FIG. 9B

F00260444258360

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TEMPERATURE: $T_1 = \text{TEMP}_1 = 600-1000^\circ\text{C}$
TIME: $t_1 = 5-60\text{s}$

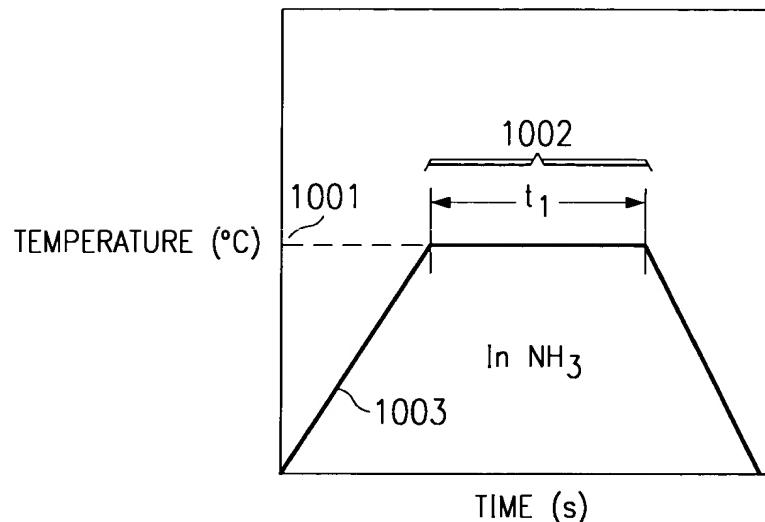


FIG. 10

TEMPERATURE: $T_1 = \text{TEMP}_1 = 800-1050^\circ\text{C}$
TIME: $t_1 = 5-60\text{s}$

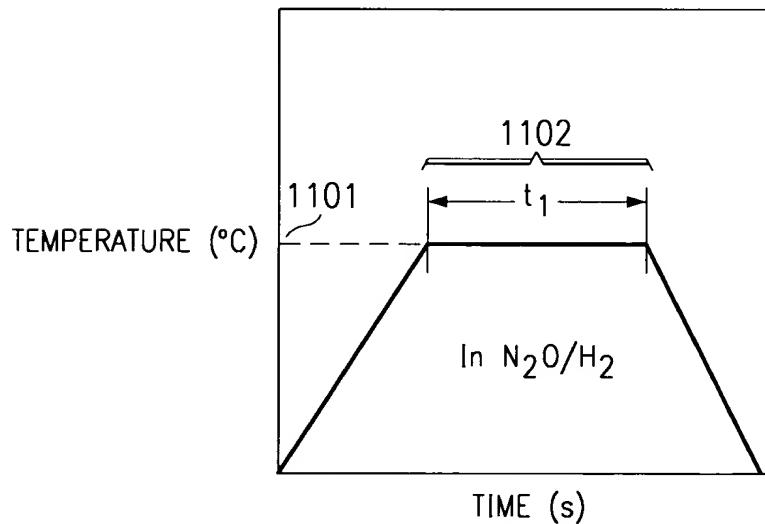


FIG. 11